Dr. Eva C. Herbst

Biomechanist and functional morphologist using and developing digital tools to determine how joints and anatomical structures work. Extensive experience in joint range of motion analysis, 3D modeling, and finite element analysis

Personal Information

Address: Palaeontological Institute and Museum
Karl-Schmid-Strasse 4, 8006 Zurich, Switzerland
email: eva.herbst@pim.uzh.ch

Website - **GoogleScholar** - **Github** - **Figshare** - **Morphosource** - **Publons** - **Orcid**

Technical Skills and Programs

CT segmentation and 3D modeling	Mimics, Avizo, Blender, Rhino, photogrammetry
Analysis and Scripting	Matlab, Python, Java *code on Github*
finite element analysis & multibody dynamics	Hypermesh, Abaqus, Artisynth
scientific rotoscoping and animation	Maya
joint range of motion using motion capture	Qualysis and Matlab
other programs	Latex
other skills	joint dissections

Education

Oct 2016 - April 2020 PhD in Biomechanics and Palaeontology
Structure and Motion Lab, Royal Veterinary College, London

August 2012 - May 2016 B.A. in Integrative Biology
U.C. Berkeley

Oct 2013 - June 2014 Degree of Higher Education in Biomedical Sciences
Durham University Study Abroad, Certificate of Higher Education

Employment and Research Experience

Dec 2019 - present Postdoctoral Researcher
Investigating form and function of Triassic reptile skulls
Palaeontological Institute and Museum, University of Zurich

Oct 2019 - present Lead Researcher OATech+ Network Pump Priming Project
Analysing bony architecture to monitor osteoarthritis of the knee
Royal Veterinary College, London and University of Zurich

Oct 2019 - Dec 2019 OATech+ Network Early Career Researcher Placement
Osteoarthritis project, Skeletal Biology Group, Royal Veterinary College London

Oct 2016 - April 2020 PhD in Palaeontology and Biomechanics
Structure and Motion Lab, Royal Veterinary College, London

Oct 2016 - April 2020	PhD in Palaeontology and Biomechanics *Structure and Motion Lab, Royal Veterinary College, London*
May 2016 - July 2016	National Science Foundation Research Experience for Undergraduates Project: *Comparative Biomechanics, Palaeontology, and Evolution, University of Missouri*
Sept 2015 - May 2016	Undergraduate Research Apprenticeship Program *Hummingbird Flight Analysis, U.C. Berkeley*
Sept 2014 - May 2016	Research Assistant and Archivist *Human Evolution Research Center, U.C. Berkeley*
June 2013 - may 2016	Research Intern and Staff *Safari West Osteology, Santa Rosa, California*
Sept 2014 - May 2015	Undergraduate Research Apprenticeship Program *Rodent Mandible Morphology Project, U.C. Berkeley*

Honors and Awards

2021 **D. Dwight Davis Award, Society of Integrative and Comparative Morphology**
Best student oral presentation in the Division of Vertebrate Morphology

2020 **Swiss Commission of Palaeontology Prize**
Best presentation in palaeontology given at the Swiss Geoscience Meeting

2016 **Franklin M. Henry Award, Integrative Biology, UC Berkeley**
Outstanding achievement in human performance and health research

2016 **Distinction in General Scholarship, UC Berkeley**
Awarded to graduates achieving high grade point average

2013, 2015 **Dean's Honors, UC Berkeley**
Awarded to graduates achieving high grade point average

Peer-Reviewed Publications

* denotes co first author

2022 **Herbst, E. C.**, Lautenschlager, S., Fioritti, N., Meade, L., Scheyer, T.M.
A toolbox for the retrodeformation and muscle reconstruction of fossil specimens in Blender
Royal Society Open Science

2022 **Herbst, E. C.**, Eberhard, E., Richards, C., Hutchinson, J.R. *In vivo* and *ex vivo* range of motion in the fire salamander *Salamandra salamandra*. *Journal of Anatomy*

2022 **Herbst, E. C.***, Eberhard, E.*, Hutschinson, J. R., Richards, C. Spherical frame projections for visualizing joint range of motion, and a complementary method to capture mobility data
Journal of Anatomy

2022 **Herbst, E. C.***, Manafzadeh, A. R.*, Hutchinson, J. R. Multi-joint analysis of pose viability supports the possibility of salamander-like hindlimb configurations in the Permian tetrapod *E. megacephalus*.
Student Awardee Paper, *Journal of Integrative and Comparative Anatomy*

2021 **Herbst, E. C.**, Lautenschlager, S., Bastiaans, D., Miedema, F., Scheyer, T. M. Modeling tooth enamel in FEA comparisons of skulls: comparing common simplifications with biologically realistic models. *iScience 24(11)*

2021 **Herbst, E. C.**, Felder, A. A., Evans, L. A. E., Ajami, S., Javaheri, B., Pitsillides, A. A. A new straightforward method for semi-automated segmentation of trabecular bone from cortical bone in diverse and challenging morphologies. *Royal Society Open Science* 8(8) Our image was selected for the journal cover

2020 Ortega-Jimenez, V. M., **Herbst, E. C.**, Leung, M. S., and Dudley, R. Natural barriers: waterfall transit by small flying animals. *Royal Society Open Science* 7201185

2019 **Herbst, E. C.**, Doube, M., Smithson, T. R., Clack, J., and Hutchinson. J. R. Bony lesions in early tetrapods and the evolution of mineralized tissue repair. *Paleobiology* 45(4)

2010 **Herbst, E. C.** and Hutchinson, J. R. New insights into the morphology of the Carboniferous tetrapod *Crassigyrinus scoticus* from computed tomography. *Earth and Environmental Science Transactions of The Royal Society of Edinburgh* 109(1-2)

Papers in Review

2021 **Herbst, E. C.**, Evans, L. A. E.*, Felder, Jahaveri, B., Pitsillides, A. A. 3D profiling of mouse epiphyses across ages reveals new potential imaging biomarkers of early spontaneous osteoarthritis submitted to Journal of Anatomy

Open Access Work

New Methods/Code	• Python-based Blender plugin for modelling 3D muscles • method for visualizing joint range of motion • method for automatic segmentation of trabecular bone • Blender remeshing guide for FEA
FEZ initiative	Founder of Finite Element Zurich
CT data and 3D models	available on Morphosource and Figshare
Open Access Course	Completed Open Life Science Program fall 2020

Invited Talks, Conference Presentations, Teaching

• gave 10 invited talks and 23 international conference presentations
(10 presented by myself, 13 by students and collaborators)
• winner of 2 awards for best talk
• taught courses and supervised students (undergraduate, master's, PhD) in biomechanics and evolution
• more details here)

Professional Service

2021 - Present	Leading Artisynth Software Discussion Group
2020	organized Finite Element Analysis Conference and Workshop with over 200 participants
2018	Session Chair, Society of Integrative and Comparative Biology Annual Meeting, San Francisco.
Peer Review	PNAS, Clinical Biomechanics, The Anatomical Record, Journal of Anatomy, Integrative Organismal Biology, Methods in Ecology and Evolution Integrative and Comparative Biology, Canadian Journal of Earth Sciences

Grants and Funding

2021 **ImagingBioPro Network Online Educational Material Grant**
development of educational materials (videos and guides) and code
mesh manipulation and trabecular segmentation
Funds: 1,000 GBP

2020 **University of Zurich GRC Grant**
Project: organized and hosted finite element analysis conference and workshop with over 200 participants and developed a website and Github organisation for sharing finite element modeling methods
Funds: 10,000 CHF

2019 **OATech+ Network Biomechanics and Mechanobiology Pump Priming Fund**
Project: Using 3D trabecular architecture as a biomarker to identify and monitor osteoarthritis of the knee
Funds: 10,000 GBP

2019 **OATech+ Network Early Career Researcher Placement**
Placement with Prof Andrew Pitsillides at RVC to work on osteoarthritis project (see above)
Funds: 3,000 GBP

2019 **Royal Veterinary College Foreign Travel Fund**
To present research at ICVM conference
Funds: 300 GBP

2018 **Royal Veterinary College Foreign Travel Fund**
To present research at SICB conference
Funds: 300 GBP

2016 **Research Experience for Undergraduates, National Science Foundation**
Biomechanics research internship with Prof. Casey Holliday and Prof. Kevin Middleton, University of Missouri
Funds: 3,500 USD

Outreach and Volunteering

2021 - Present	Volunteering as English and Math tutor for refugees Students Across Borders
2022	Outreach video for Biomechanics Research and Innovation Challenge
2020	Interview with Real Scientists DE (in German)
2019	Outreach display, Early Tetrapod Evolution Night at the Vet College, Royal Veterinary College, London
2017	Outreach display, Early Tetrapod Evolution Annual Open Day, Royal Veterinary College, London
2017	Guest blog post about *Crassigyrinus* on Anatomy to You blog
2013-2016	Comparative anatomy outreach events at Safari West Wildlife Park

Professional Development and Certificates

2022	Good Clinical Practice online course and certification
2022	Data Analysis for Medical Research using R, Epidemiology, Biostatistics and Prevention Institute, UZH
2021	GAMMA Workshop Balgrist, Zurich: "Models, methods and functional tests in motion analysis". Accredited by Swiss Orthopaedics (6 credits) and Physio Swiss (12 credits)
2021	Scientific Programming with Python, Physics Department, UZH
2020	Open Life Science Course
2020	SlicerMorph 3D Morphometrics Course
2019	Avizo Course 3DMAGINATION Ltd.
2018	MatLab Fundamentals Course
2017	Teaching and Learning in Higher Education Certificate Royal Veterinary College, London

Languages

English:	fluent
German:	fluent